Probability Trees Explained

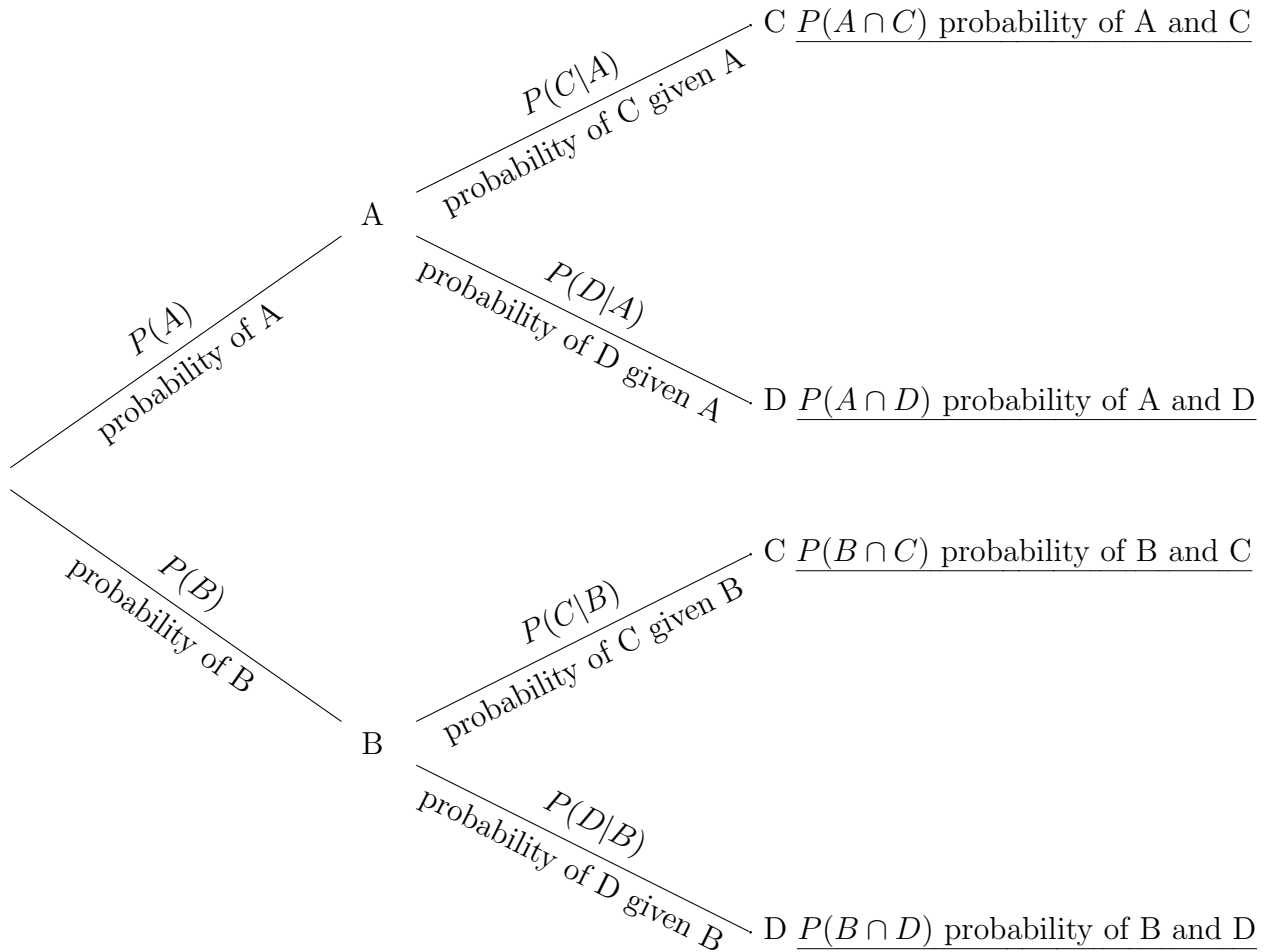Bon Crowder
www.MathFour.com

March 30, 2013

Introduction

Probability trees are a tool. Some people find them rather helpful in visualizing how the various pieces of probability go together.
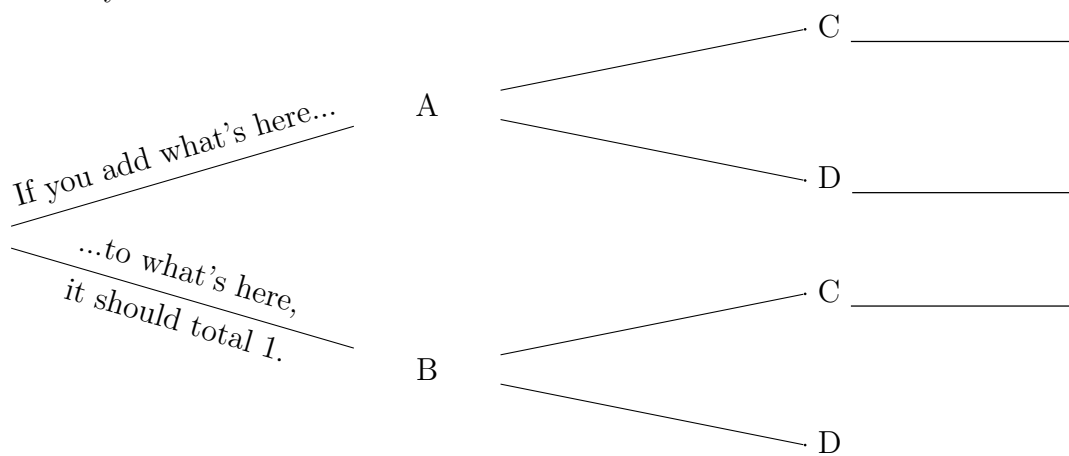
This document isn't intended to explain why we do probability trees or any theory behind probability. It is merely a quick reference sheet to help students understand the "puzzle" nature of probability trees.

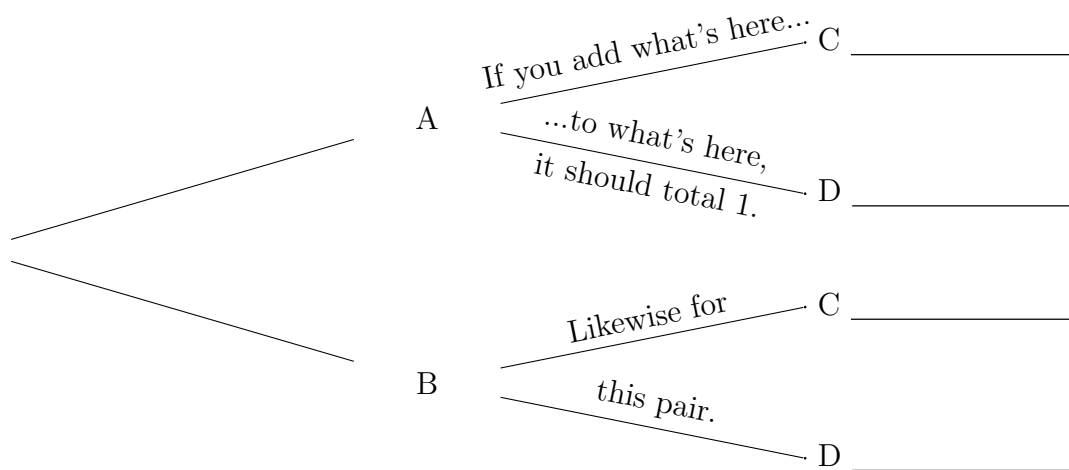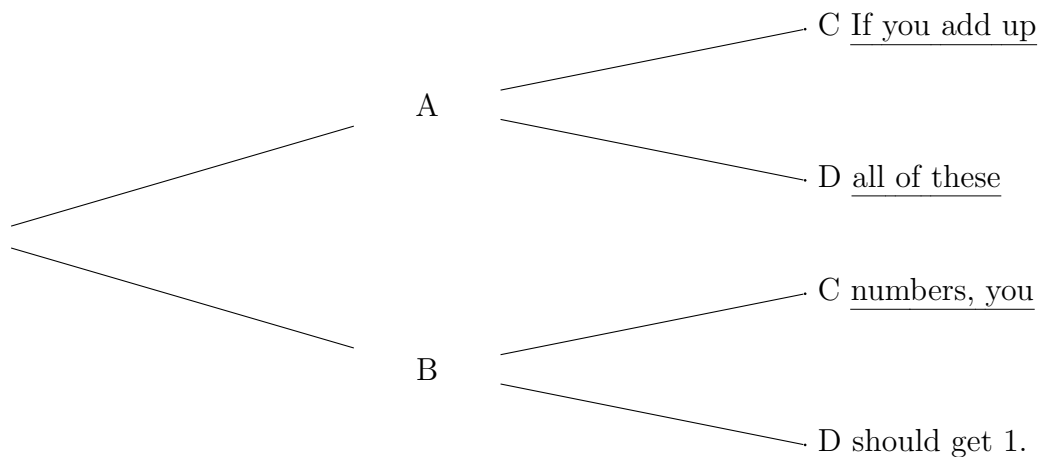Here is the official layout and some terminology:

Sums Total 1

In the case of every tree:

If you add what's here...

...to what's here, it should total 1.

A

C _____

D _____

B

C _____

D _____

And:

A

If you add what's here...

C _____

...to what's here, it should total 1.

D _____

B

Likewise for

C _____

this pair.

D _____

And:

A

C If you add up
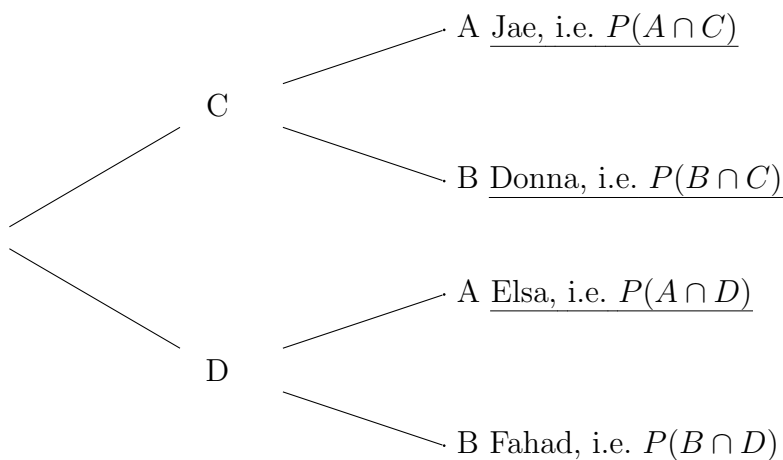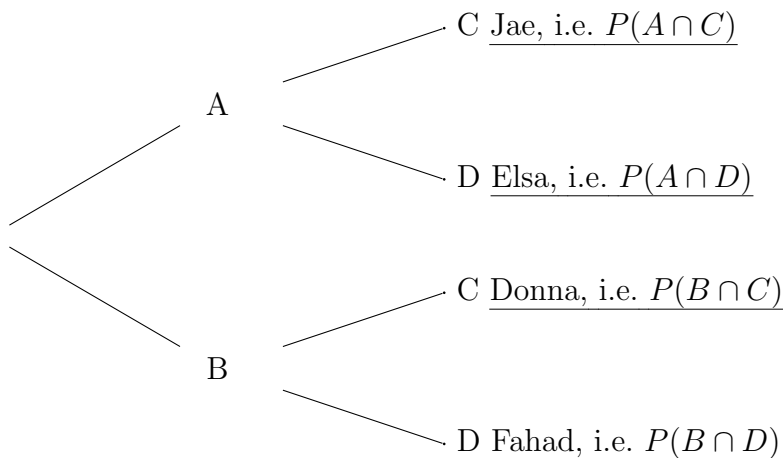
D all of these

B

C numbers, you

D should get 1.

The "Leafs" are Intersections

Now consider "reversing" the probability tree. Notice the things that are alike in these two.

Pay close attention to the change in the positioning of A/B and C/D from the top one to the bottom one.
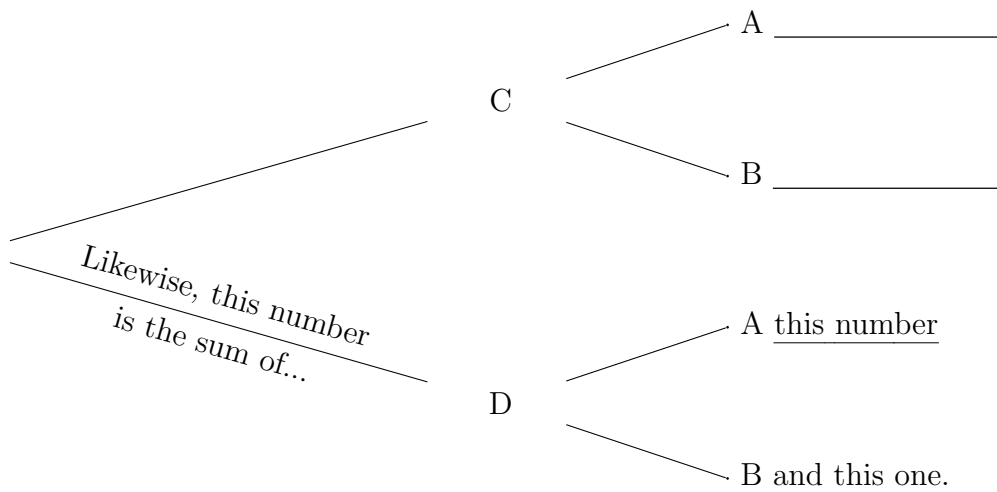
I've given them names to help you see the correlations:

C Jae, i.e. $P(A \cap C)$

A

D Elsa, i.e. $P(A \cap D)$

C Donna, i.e. $P(B \cap C)$

B

D Fahad, i.e. $P(B \cap D)$

A Jae, i.e. $P(A \cap C)$

C

B Donna, i.e. $P(B \cap C)$

A Elsa, i.e. $P(A \cap D)$

D

B Fahad, i.e. $P(B \cap D)$

Which means you can copy and paste those endpoints from one to the other!

Add the Leafs to get the Big Branches

Now to get the other pieces of the reversed tree, you work backwards:

*This number is the
sum of the two ends...*

C

A ... this one

B and this one.

D

A _____

B _____

*Likewise, this number
is the sum of...*

C

A _____

B _____

D

A this number

B and this one.
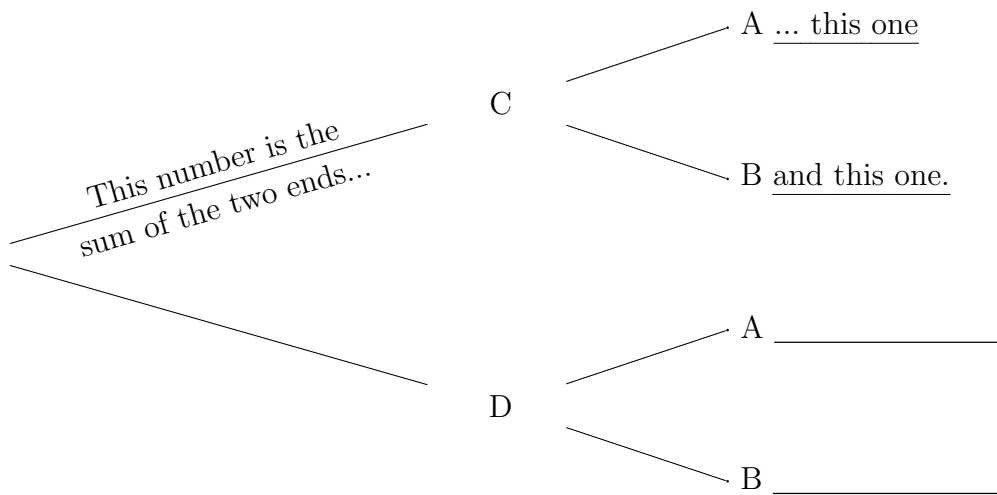
Multiply the Branches to get the Leafs

One thing to note is that the numbers on the ends come from multiplying the numbers down the "branches."

Multiply this number — C — *with this number* — A <u>to get the number here.</u>

B _____

D — A _____

B _____
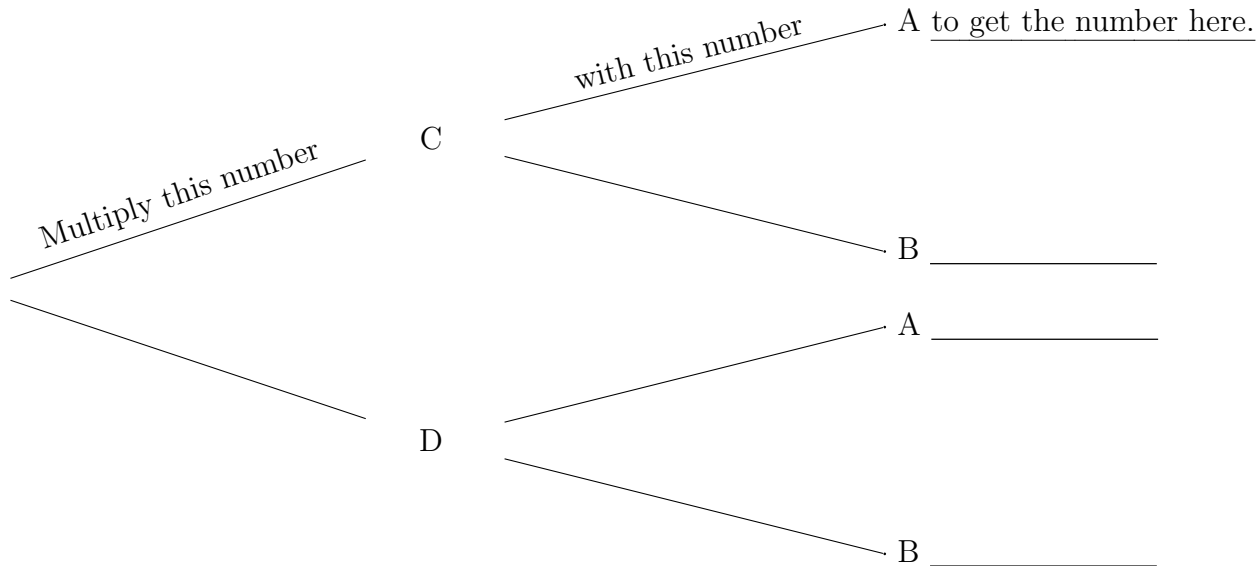
Each end "leaf" works like this. Which means you can do some division to get the numbers in the middle - if that's what you're missing:

I'm Manny! — C — A _____

this is Daisy÷Manny — B <u>I'm Daisy!</u>

D — A _____

B _____
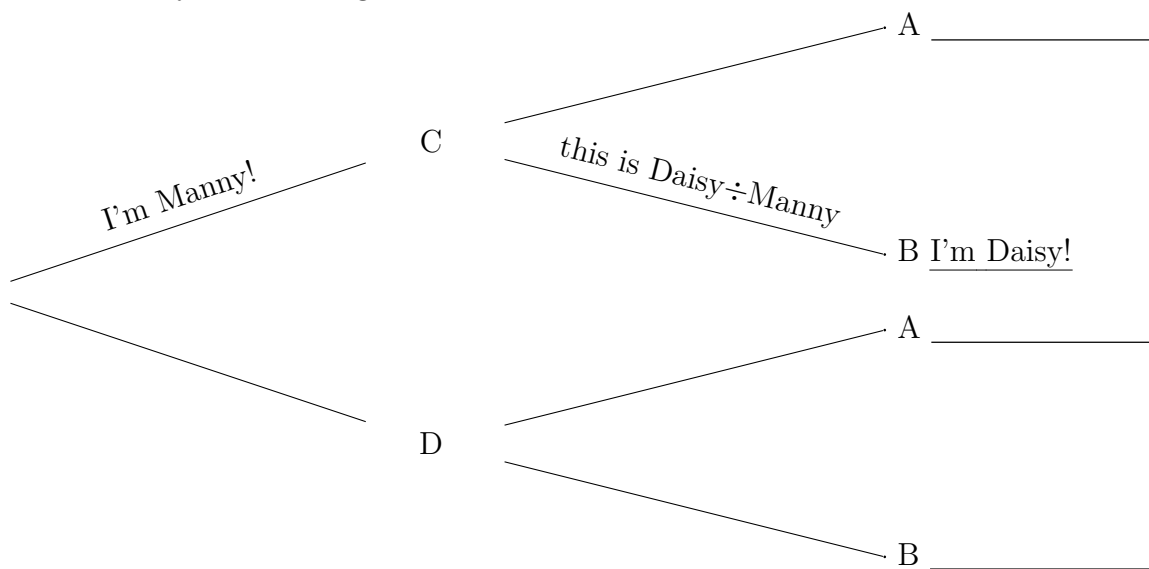
You're Done!

With this handful of tips and tricks, you should be able to master the fine art of probability trees.

Remember, they are a tool to be used - consult your instructor and/or textbook for problem sets and theory.